US-PAT-NO: 5673252

DOCUMENT-IDENTIFIER: US 5673252 A
See image for Certificate of Correction

TITLE: Communications protocol for remote data generating stations

---------- KWIC ---------

Detailed Description Text - DETX (247):
Stop-and-Wait ARQ: Stop-and-wait ARQ is based on stop-and-wait flow control. The destination node sends back ACK or **NAK** for each packet received, and the source node must use timeout in case either original packet or acknowledgement of the original packet is lost. **Packets** are sequence numbered, typically 1-bit minimum, in case the source **retransmits** due to lost ACK. When this technique is adapted to sliding-window flow control, the technique is referred to as continuous ARQ.

Detailed Description Text - DETX (248):
Go-back-N ARQ: Go-back-N ARQ is a continuous ARQ variant based on sliding-window flow control. If multiple **packets** are transmitted, and one is lost, i.e., source node times out waiting for ACK/**NAK,** or is damaged, i.e., destination node sends back a **NAK,** then that packet and all those which came after it are **retransmitted**. If an ACK is lost or damaged, but a subsequent ACK is sent before the source node times out, then the later ACK is cumulative and no retransmissions are required. Packets must be sequence numbered, and up to n=2.sup.k -1 ACKs may be outstanding.

US-PAT-NO: 5517668

DOCUMENT-IDENTIFIER: US 5517668 A

TITLE: Distributed protocol framework

---------- KWIC ---------

Detailed Description Text - DETX (548):

After receiving a **NAK** m message, **retransmit all packets** with sequence number greater or equal to m.

US-PAT-NO: 6424625

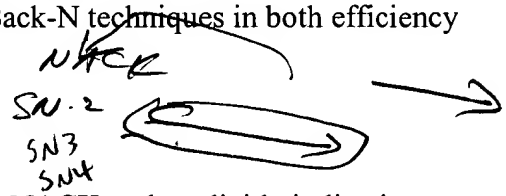
DOCUMENT-IDENTIFIER: US 6424625 B1

TITLE: Method and apparatus for discarding packets in a data network having automatic repeat request

---------- KWIC ---------

Brief Summary Text - BSTX (5):

There are three main **ARQ** schemes: Stop-and-Wait; **Go-Back**-N; and Selective Reject (sometimes referred to as Selective Repeat). All three methods provide mechanisms for transferring packets to a receiver in a data network in an appropriate order. In terms of throughput efficiency as a function of the signal to noise ratio, generally Selective Reject is most efficient, Stop-and-Wait is least efficient, and Go-Back-N is intermediate. Also, various mixtures of the Selective Reject and Go-Back-N techniques exist, and fall between pure Selective Reject and pure Go-Back-N techniques in both efficiency and complexity.



Brief Summary Text - BSTX (21):

NACKs can be efficiently sent by sending a NACK and explicitly indicating the oldest NACK's sequence number, here represented by ESN1, and using a **bitmap** to thereafter represent correctly received packets and missing packets. This type of NACK performs a cumulative PACK for the packets preceding the sequence number which is NACKed. Other NACK options can also be used, for example NACK options where a cumulative positive ACK is not performed or sent for the packets preceding the sequence number which is NACKed.

Detailed Description Text - DETX (22):

Assume that one use of NACK includes the following characteristics. When a NACK is sent, the oldest not-yet-received packet is explicitly indicated by its sequence number. Packets with sequence numbers preceding this oldest, outstanding packet are at the same time positively acknowledged by this NACK message. Accompanying this NACK can be a) a **bitmap** of length n indicating outstanding packets, wherein, for example, those bits that are set to one indicate outstanding packets, or b) a number N of explicitly indicated sequence

US-PAT-NO: 5983382

DOCUMENT-IDENTIFIER: US 5983382 A

TITLE: Automatic retransmission query (ARQ) with inner code for generating multiple provisional decodings of a data packet

---------- KWIC ---------

Brief Summary Text - BSTX (4):

Communication systems with automatic retransmission query (ARQ) functionality allow a receiver to indicate to a transmitter that a given data packet was received with errors and should therefore be retransmitted. ARQ techniques are also referred to as automatic repeat request techniques, and are described generally at pp. 259-260 of B. Sklar, "Digital Communications: Fundamentals and Applications," Prentice Hall, Englewood Cliffs, N.J., 1988, which is incorporated by reference herein. A conventional ARQ technique known as stop-and-wait ARQ is suitable for use with half-duplex transmission channels. In stop-and-wait ARQ, a receiver sends an acknowledge (ACK) signal to a transmitter after a given packet is received successfully. The transmitter waits until the ACK signal is received for the given packet before transmitting the next packet in a sequence of packets to be transmitted. If the receiver detects an error in a given packet, it sends a negative acknowledge (**NAK**) signal to the transmitter, and the transmitter then retransmits the given packet. Other ARQ techniques suitable for use with full duplex transmission channels include continuous ARQ with pullback and continuous ARQ with selective repeat. In both of these techniques, after transmitting a given packet, the transmitter continues to transmit additional packets in the packet sequence even though an ACK signal has not yet been received for the given packet. If the receiver sends a **NAK** signal indicating that the given packet needs to be **retransmitted,** a transmitter implementing continuous ARQ with pullback responds to the **NAK** signal by returning to the given packet in the sequence, and **retransmitting** the given packet and all subsequent **packets** which were transmitted prior to receiving the **NAK** signal for the given packet. A transmitter implementing continuous ARQ with selective repeat also **retransmits** the given packet, but then picks up in the sequence where it left off before receiving the **NAK** signal, such that **packets** following the given packet are not **retransmitted** unless **NAK** signals are also received for

numbers for which packets have not been received, or c) some combination of a) and b).